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FIELD PROFILE AND LOADING MEASUREMENTS ON HIGHER ORDER MODES IN A TWO CELL 500 MHz SUPERCONDUCTING STRUCTURE*

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The Infrared Free Electron Laser, being designed at LBL as part of the Chemical Dynamics Research Laboratory, is based on a 500 MHz superconducting linac driver that consists of five 4-cell structures of the CERN/DESY type. A 500 MHz, 2-cell version of this structure is being used in a joint Stanford/LBL/BNL program to study accelerator issues relevant to the FEL applications. As part of this study, field profile and loading measurements in Higher Order Modes have been made on the prototype structure with special emphasis given to the role of manufacturing tolerances and the effect of frequency tuning. Loading of the trapped dipole mode has been studied in detail.

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HIGHER ORDER MODE AND FIELD PROFILE MEASUREMENTS ON THE TRW/STANFORD/LBL/BNL 2-CELL NIOBIUM 500 MHZ SUPERCONDUCTING ACCELERATOR STRUCTURE*

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The accelerator for the infrared free-electron laser (FEL), currently being designed at LBL as apart of the Chemical Dynamics Research Laboratory (CDRL), is based on five 4-cell, 500 Mhz, superconducting RF cavities. Siemens (Interatom) built a 2-cell, 500 Mhz prototype cavity including two electric and two magnetic higher order mode (HOM) couplers for TRW. The prototype cavity is being used by the TRW/Stanford/LBL/BNL collaboration to study various issues of using superconducting accelerators for FELs. The on-axis field profile of each longitudinal and dipole mode below their respective beam pipe frequencies were measured. The sensitivity of the mode Qs and field profiles to the compression of one cell was studied. The goal is to determine the required manufacturing tolerances, effects of tuning, and the effects of microphonic vibration on the field profile and resonant frequency. The study will be incorporated in the design of the 4-cell structure for the CDRL FEL to minimize any deleterious effects from tuning, field flattening or microphonics.

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Special Request: All poster papers from the IRFEL group at LBL to be grouped physically together in the same session.